A GUIDE TO THE GENERA AND SPECIES OF PARNASSIINAE (LEPIDOPTERA : PAPILIONIDAE)

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CONTENTS

SYNOPSIS

Illustrated keys are given to the seven genera and 44 species of Parnassiinae here recognized, together with brief notes on the distribution and larval food plants of each species. For polytypic species a list is given of the subspecies that differ most markedly from the typical form. One generic synonym is newly established.

INTRODUCTION

THE inconsistency of the wing pattern within many species of the Parnassiinae has inspired the description of numerous subspecies and forms, principally in the works of Fruhstorfer, Bang-Haas, Bryk and Eisner. Thus, although the literature is extensive, it is concerned mainly with intra-specific variation rather than the definition and identification of the recognized species. Bryk (1934; 1935) includes keys to the Parnassiinae in his extensive monograph; however, the lack of availability of this work, together with the great emphasis placed on variation within species throughout the study, renders it unsuitable as a ready means of identification to species. It is hoped that this present work will to some degree fill this apparent gap in the literature available to lepidopterists interested in the Parnassiinae.

There has been considerable difference of opinion concerning the higher classification of this subfamily, the two tribes here recognized, the Parnassiini and Zerynthiini, being regarded by Bryk (1934; 1935) and Ford (1944) as subfamilies, while Clench

(1955) and Hemming (1960) have suggested that they be accredited with family status. I have followed Ehrlich (1958) and Munroe (1960) in treating the two groups as tribes which together form the subfamily Parnassiinae.

At the generic and specific levels there has been more general agreement, except over the status of the genus *Parnassius* and its species (see pp. 76–77). *Sericinus*, *Archon* and *Hypermnestra* are at present monotypic, *Bhutanitis* contains four species and the far-eastern genus *Luehdorfia* consists of two species. *Allancastria*, hitherto a valid monotypic genus, is here considered to be a junior synonym of *Parnalius*, which now includes three species. I have adopted Munroe's (1960) broad concept of *Parnassius*, which is regarded here as comprising 32 species. Examples of each genus are illustrated in the Frontispiece, figs 1–7.

To include notes on all the described forms is certainly not the purpose of this work. I have, however, listed under the relevant species some of those subspecies that seem to differ most markedly from the more typical forms, together with their localities and points of difference. No attempt has been made to produce a comprehensive list of all the subspecies described.

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KEY TO THE GENERA OF PARNASSIINAE

1		Outer margin of hindwing rounded, without tails . . . (Parnassiini)	2
–		Tails of various lengths present on the outer margin of hindwing (Zerynthiini)	4
2	(1)	Claspers of male narrow (Text-fig. 1); forewing with five radial veins (Text-fig. 18) ***ARCHON*** Hübner (p. 75)	
–		Claspers of male various, never narrow; forewing with four radial veins . .	3
3	(2)	Male tarsal claws equal (Text-fig. 29) . . ***HYPERMNESTRA*** Ménétriés (p. 75)	
		Male tarsal claws sub-equal (Text-fig. 30) . . ***PARNASSIUS*** Latreille (p. 76)	
4	(1)	Vein M_3 of hindwing produced to a short tapering or rounded tooth (Text-figs 17, 19) . . . . . ***PARNALIUS*** Rafinesque (p. 90)	
–		Vein M_3 of hindwing produced to a distinct tail	5
5	(4)	Uncus short, bifid (Text-fig. 16); hindwing tail on vein M_3 longer than the discal cell of hindwing; vein R_3 of forewing usually arising from discal cell (Text-fig. 26) . . . . . ***SERICINUS*** Westwood (p. 90)	
–		Uncus elongate, bifid; hindwing tail on vein M_3 no longer than the discal cell; vein R_3 normally stalked with R_{4+5}	6
6	(5)	Precostal cell wide; tails well developed on veins Cu_{1a} and Cu_{1b} of hindwing (Text-fig. 25); internal ventral surface of claspers smooth (Text-figs 14, 15) ***BHUTANITIS*** Atkinson (p. 93)	

– Precostal cell narrow; tails rudimentary on veins Cu_{1a} and Cu_{1b} of hindwing (Text-fig. 23); internal ventral surface of claspers spinose (Text-figs 12, 13) ***LUEHDORFIA*** Crüger (p. 92)

NOTES ON THE GENERA, WITH KEYS TO THE SPECIES WHERE APPLICABLE

Tribe **PARNASSIINI**

Parnassinae Swainson, 1840 : 87, 90. Type-genus: *Parnassius* Latreille.

ARCHON Hübner

[*Doritis* Fabricius sensu Hübner, [1819] : 86.]
Archon Hübner, [1822]: 2, 6, 8, 9. Type-species: *Papilio thia* Hübner, by subsequent designation (Scudder, 1875 : 117).
Dorarchon Rothschild, 1918 : 219. Type-species: *Papilio apollinus* Herbst, by monotypy.
Archon Hübner; Bryk, 1934 : 19.
Archon Hübner; Munroe, 1960 : 10.

The name *Doritis* is still commonly used for this taxon, although *Papilio apollo* Linnaeus is clearly the type-species of *Doritis*, not *Papilio apollinus* Herbst as was erroneously believed.

Archon apollinus (Herbst)

(Pl. 1, figs 1, 2, Text-figs 1, 18)

Papilio apollinus Herbst, 1798 : 156.
Papilio thia Hübner, [1806] : 60.
Archon apollinus (Herbst); Bryk, 1922 : 224; 1934 : 23.
Archon apollinus (Herbst); Eisner, 1966 : 89.

DISTRIBUTION. Rumania. Bulgaria. Turkey. U.S.S.R.: Armenia, Turkmenistan. Greece. Syria. Iraq. Lebanon. Israel.

LARVAL FOOD PLANTS. *Aristolochia hastata* (Higgins & Riley, 1970). *A. bodame* (Bryk, 1934). *A. maurorum* (Suguru Igarashi, in litt.).

HYPERMNESTRA Ménétriés

Ismene Nickerl, 1846 : 207. Type-species: *Ismene helios* Nickerl, by monotypy. [Junior homonym of both *Ismene* Savigny, 1816, and *Ismene* Swainson, 1820.]
Hypermnestra Ménétriés, 1848 : pl. 6, fig. 1. [Replacement name for *Ismene* Nickerl.]
Hypermnestra Ménétriés; Bryk, 1935 : 4.
Hypermnestra Ménétriés; Munroe, 1960 : 10.

Ehrlich (1958) says that there are reports of *Parnassius* species in which the males have nearly symmetrical claws as in *Hypermnestra* Ménétriés; however, I have always found the tarsal claws of male *Parnassius* to be subequal.

Hypermnestra helios (Nickerl)

(Pl. 1, figs 3, 4, Text-figs 2, 20, 29)

Ismene helios Nickerl, 1846 : 208, pl. 3, figs a–g.
Hypermnestra helios (Nickerl); Bryk, 1935 : 7.
Hypermnestra helios (Nickerl); Eisner, 1966 : 121

DISTRIBUTION. Iran. Afghanistan. U.S.S.R.: Uzbekistan, Kirghizia.

LARVAL FOOD PLANTS. *Zygophyllum* (Munroe, 1960). *Z. turcomanicum* (Verity, 1906). *Z. atriplicoides* (Bryk, 1935). *Z. fabago*, *Z. portulacoides* (Eisner, 1968). *Z. gontsharovii* (Stschetkin, 1963).

PARNASSIUS Latreille

Parnassius Latreille, 1804 : 185, 199. Type-species: *Papilio apollo* Linnaeus, by monotypy.
Doritis Fabricius, 1807 : 283. Type-species: *Papilio apollo* Linnaeus, by subsequent designation (Dalman, 1816 : 60).
Tadumia Moore, 1902 : 116. Type-species: *Parnassius acco* Gray, by original designation. [Synonymized by Munroe, 1960 : 11.]
Kailasius Moore, 1902 : 118. Type-species: *Parnassius charltonius* Gray, by original designation. [Synonymized by Munroe, 1960 : 11.]
Koramius Moore, 1902 : 120. Type-species: *Parnassius delphius* Eversmann, by original designation. [Synonymized by Munroe, 1960 : 11.]
Lingamius Bryk, 1935 : 538–540. Type-species: *Parnassius hardwickii* Gray, by original designation. [Synonymized by Munroe, 1960 : 11.]
Eukoramius Bryk, 1935 : 630, 673–674. Type-species: *Parnassius imperator* Oberthür, by monotypy. [Synonymized by Munroe, 1960 : 11.]

Bryk (1935) divides *Parnassius* into five genera on the basis of differences in the wing venation and relative lengths of the foretibial epiphysis. As shown by Munroe (1960) the groups so defined do not agree with those indicated by the male genitalia. I am adopting Munroe's broad concept of this genus, but not his suggested division into two subgenera, *Parnassius* s. str. and *Doritis*. The latter name cannot have any valid use as it is a junior objective synonym of *Parnassius*.

Elwes (1886) attempted to define the limits of the species, focusing attention on the wide differences in the shape of the sphragis. The comparative morphology of the species is discussed by Hering (1932) who recognizes only six distinct species, this arrangement being followed by Fisher (1950). A revision of the *mnemosyne* group is presented by Müller (1973), partly based on new morphological characters derived from the comparative structure and arrangement of the wing scales.

Valuable information on this genus is to be found in some of the faunistic studies on butterflies. Kurentsov (1970) illustrates and discusses the *Parnassius* of the eastern U.S.S.R. and the distinguishing characters exhibited by the three western Palaearctic species are given by Higgins & Riley (1970). Yokohama & Wakabayashi (1968) illustrate the representatives in the Japanese fauna, whilst five species are included by Seok (1939) in his check list of Korean butterflies. The Asian species, *nomion* Fischer de Waldheim, is doubtfully listed by Wilson (1961) in his identification key of North American Papilionidae, but excluded by Dos Passos (1964).

The studies of the Indian fauna provide useful keys, notably in the works of Evans (1927) and Talbot (1939). A complete key to the 34 species then recognized is given by Bryk (1935). Munroe (1960) notes 37 species, five more than Eisner (1966), but the only species included here are those listed by Eisner in his index to the 'Parnassiana' and 'Parnassius Nova' series.

The apparent uniformity of structure within the species-groups, as defined by Munroe (1960), together with the multiplicity of variations in the wing pattern within most of the species, presents some difficulty in the preparation of a key to the species of *Parnassius*. The wing pattern is used as the principal means of differentiating between the species since the structural characters derived from the genitalia, wing venation, sphragis and foretibial epiphysis, are generally applicable at the species-group level only. As the following key is based on wing pattern at the species level, it is to be expected that atypical specimens, particularly in the *actius-jacquemontii-phoebus* subgroup, will not always run out satisfactorily. It must therefore be emphasized that the present work should be used only as a guide.

This genus is generally distributed throughout the mountainous and northern areas of the Palaearctic and western Nearctic regions, the inaccessibility of many likely localities probably accounting for the rarity of some species.

Key to the species of *PARNASSIUS* Latreille

1 Uncus normally plainly visible, spatulate, lying between the two elongate processes on the tenth tergite (Text-fig. 31); sphragis keeled and with a simple, single, backward-pointing flange (Pl. 15, fig. 98) [keel lacking in *epaphus* Oberthür]; hindwing upperside lacking submarginal series of blue spots 2

– Uncus sometimes enclosed by eighth abdominal tergite and bifid, never spatulate (Text-fig. 32) [simple and truncate in *simo* Gray]; sphragis various, never keeled and always lacking a single backward-pointing flange (Pl. 15, figs 99–105); hindwing upperside often with submarginal series of blue centred spots 16

2 (1) Antennae dark, lacking white scales 3

– Antennae with some white scales 5

3 (2) Submarginal band of forewing and hindwing broken up into a distinct series of internervular black spots (Pl. 1, figs 5, 6) . ***apollonius*** (Eversmann) (p. 80)

– Submarginal band of hindwing indistinct or absent 4

4 (3) Pubescence of body mostly pale beneath; wing veins above exceptionally distinct, with a covering of black scales; forewing above usually lacking red markings (Pl. 2, figs 9, 10) . . . . . ***bremeri*** Bremer (p. 81)

– Body clothed with thick black pubescence beneath; wing veins above without black scales; forewing above usually with red markings (Pl. 1, figs 7, 8) ***honrathi*** Staudinger (p. 80)

5 (2) Scaling of antennae, excluding the club, completely white above . . . 6

– Scaling of antennae, excluding the club, dark and white above . . . 7

6 (5) Margins distinctly chequered, being black about the wing veins and white in the internervular areas; upper surface of hindwing often with a distinct red basal spot (Pl. 3, figs 17, 18) . . . ***nomion*** Fischer de Waldheim (p. 82)

– Margins usually white, sometimes indistinctly chequered; upper surface of hindwing seldom with a red basal spot (Pl. 3, figs 23, 24) ***apollo*** (Linnaeus) (p. 83)

7 (5) Males 8
– Females 12
8 (7) Eighth abdominal tergite rounded posterio-laterally 9
– Eighth abdominal tergite pointed posterio-laterally 10
9 (8) Marginal and submarginal forewing bands poorly developed; ground colour of upperside creamy white; discal spot in cell Cu_{1b} of forewing upperside absent or rudimentary, seldom distinctly scaled below and never centred with red (Pl. 2, fig. 11) . . . . . ***phoebus*** (Fabricius) (p. 81)
– Marginal and submarginal bands of forewing well developed; ground colour of upperside grey-white, often distinctly dusted with black; discal spot in cell Cu_{1b} of forewing upperside usually present, distinctly scaled below and often centred with red (Pl. 3, fig. 21) . ***tianschanicus*** Oberthür (p. 82)
10 (9) Basal red spot usually present in hindwing upperside; discal spot in cell Cu_{1b} of forewing underside often heavily scaled, sometimes centred with red (Pl. 2, fig. 15) . . . . . ***jacquemontii*** Boisduval (p. 81)
– Basal red spot normally absent from the hindwing upperside, if present the discal spot in cell Cu_{1b} of forewing underside is lightly scaled, not centred with red 11
11 (10) Black basal scaling normally quite extensive; margins of forewings usually distinctly chequered, being black about the veins and white in the internervular areas (Pl. 3, fig. 19) . . . . . ***epaphus*** Oberthür (p. 82)
– Black basal scaling usually less extensive; margins of forewing seldom distinctly chequered (Pl. 2, fig. 13) . . . . . ***actius*** (Eversmann) (p. 81)
12 (7) Sphragis lacking a keel (Pl. 3, fig. 20) . . . ***epaphus*** Oberthür (p. 82)
– Sphragis strongly keeled 13
13 (12) Discal spot in cell Cu_{1b} of forewing underside distinctly scaled; red basal spot never present in hindwing upperside; upperside distinctly dusted with black scales (Pl. 3, fig. 22) . . . . . ***tianschanicus*** Oberthür (p. 82)
– Discal spot in cell Cu_{1b} of forewing underside normally only lightly scaled, if distinctly scaled then red basal spot normally present in hindwing upperside; upperside not distinctly dusted with black 14
14 (13) Abdomen usually hairy, almost as much so as the male [Asian species only] (Pl. 2, fig. 14) . . . . . ***actius*** (Eversmann) (p. 81)
– Abdomen not exceptionally hairy [except European *phoebus*] . . . 15
15 (14) Hindwing upperside normally with a distinct red basal spot [Asian species only] (Pl. 2, fig. 16) . . . . . ***jacquemontii*** Boisduval (p. 81)
– Hindwing upperside seldom with a distinct red basal spot [N. American, European & Asian species] (Pl. 2, fig. 12) . ***phoebus*** (Fabricius) (p. 81)
16 (1) Foretibial epiphysis short, not reaching the end of the tibia (Text-fig. 27); hindwing upperside without a submarginal series of blue spots (except *orleans* Oberthür) 17
– Foretibial epiphysis longer, often reaching the end of the tibia (Text-fig. 28); hindwing upperside usually with a submarginal series of blue spots . . 24
17 (16) Hindwing underside lacking red ocelli 18
– Hindwing underside usually with red ocelli 20
18 (17) Outer surface of palpi dark, occasionally with a few light yellow scales; face lacking white hairs; bifid uncus with paired ventral processes (Text-fig. 6, Pl. 4, figs 29, 30) . . . . . ***glacialis*** Butler (p. 84)
– Outer surface of palpi with white scales; face with some white hairs; bifid uncus without ventral processes 19
19 (18) Forewing upperside usually with two black spots in the discal cell; clasper of male weakly produced posteriorly, never ending in a long thin point (Pl. 4, figs 25, 26) . . . . . ***mnemosyne*** (Linnaeus) (p. 83)

– Forewing upperside without two black spots in the discal cell; clasper of male strongly produced posteriorly, ending in a long thin point (Pl. 4, figs 27, 28) ***stubbendorfii*** Ménétriés (p. 84)

20 (16) Face usually with golden yellow pubescence 21

– Pubescence of face black, pale yellow or white 22

21 (20) Basal black scaling of hindwing upperside sharply differentiated; margins of hindwing underside black; wings of male often yellow (Pl. 4, figs 31, 32, Pl. 5, figs 33, 34) . . . . . ***eversmanni*** Ménétriés (p. 84)

– Basal dark scaling of hindwing upperside not sharply divided from the white ground colour; margins of hindwing underside partly white; wings of male never yellow (Pl. 5, figs 39, 40) . . . . . ***clodius*** Ménétriés (p. 85)

22 (20) Hindwing upperside and underside with a submarginal series of internervular blue-centred spots; margins of forewing upperside usually distinctly chequered, black about the veins and white in the internervular areas (Pl. 6, figs 41, 42) . . . . . ***orleans*** Oberthür (p. 85)

– Hindwing upperside lacking blue-centred internervular spots; forewing margins never divided into distinct black and white areas 23

23 (22) Forewing apex largely hyaline, the submarginal internervular markings usually absent, if present pale and indistinct; veins of hindwing underside pale (Pl. 5, figs 35, 36) . . . . . ***nordmanni*** (Nordmann) (p. 85)

– Forewing above with submarginal internervular markings forming a distinct band in the wing apex; veins of hindwing underside dark (Pl. 5, figs 37, 38) ***ariadne*** Lederer (p. 85)

24 (16) Vein R_2 stalked with vein R_{3-5}, not arising from discal cell (Text-fig 24) . 25

– Vein R_2 arising from discal cell (Text-figs 21, 22) 28

25 (24) Hindwing upperside usually with large red postdiscal spots 26

– Red postdiscal spots of hindwing upperside small or absent 27

26 (25) Hindwing blue-black internervular submarginal spots absent from cell R_5; sphragis straight (Pl. 9, figs 67, 68, Pl. 15, fig. 105) ***inopinatus*** Kotzsch (p. 89)

– Hindwing blue-black internervular submarginal spot present in cell R_5; sphragis coiled (Pl. 9, figs 65, 66, Pl. 15, fig. 104) . ***charltonius*** Gray (p. 88)

27 (25) Hindwing upperside without red markings but with an orange postdiscal band, wide in female, narrow in male (Pl. 9, figs 71, 72) . ***autocrator*** Avinoff (p. 89)

– Hindwing upperside with red markings and lacking an orange postdiscal band (Pl. 9, figs 69, 70) . . . . . ***loxias*** Püngeler (p. 89)

28 (24) Vein R_2 anastomosing with vein R_1 (Text-fig. 21) 29

– Vein R_2 not anastomosing with vein R_1 (Text-fig. 22) 32

29 (28) Hindwing upperside usually with large blue-centred submarginal spots; sphragis large, bilobate (Pl. 8, figs 63, 64, Pl. 15, fig. 103) ***imperator*** Oberthür (p. 88)

– Hindwing upperside seldom with large blue-centred submarginal spots; sphragis never bilobate 30

30 (29) Uncus short, strongly bifid; sphragis normally laterally flattened, forming a complete ring about the abdomen (Pl. 7, figs 51, 52, 53, 54) ***acco*** Gray (p. 86)

– Uncus simple or weakly bifid; sphragis never laterally flattened or forming a complete ring about the abdomen 31

31 (30) Uncus short, simple (Text-fig. 8); sphragis rudimentary; hindwing underside with few postdiscal spots (Pl. 10, figs 73, 74) . . ***simo*** Gray (p. 89)

– Uncus elongate, weakly bifid (Text-fig. 3); sphragis well formed, distinct; hindwing underside with a complete row of postdiscal spots (Pl. 10, figs 75, 76) . . . . . ***tenedius*** Eversmann (p. 89)

32 (28) Clasper broad; internal process half to two-thirds the length of the clasper (Text-figs 4, 5); sphragis simple, usually laterally flattened (Pl. 15, fig. 100) . 33

– Clasper narrow, distally pointed; internal process one-third the length of the clasper (Text-fig. 7); sphragis bilobate (Pl. 15, figs 101, 102). 35

33 (32) Veins of hindwing underside bordered with white scales which cover the veins (Pl. 6, figs 45, 46) . . . . . ***szechenyii*** Frivaldsky (p. 86)

– Wing veins clearly visible, not covered by white scales 34

34 (33) Male with a distinct row of bristles anterior to the uncus; clasper produced dorsally to a distinct angle (Text-fig. 4); submarginal blue spots of hindwing upperside usually centred with white (Pl. 6, figs 43, 44) ***hardwickii*** Gray (p. 86)

– Male without a distinct row of bristles anterior to the uncus; clasper large, rounded; submarginal spots of hindwing upperside, when present, seldom centred with white (Pl. 6, figs 47, 48) . . . ***cephalus*** Grum-Grshimailo (p. 86)

35 (32) Sclerotized area of male eighth abdominal tergite produced posteriorly to give two finger-like projections; sphragis produced backwards, forming two lateral points (Pl. 15, fig. 101); basal black scaling of hindwing upperside usually very extensive, often surrounding the red ocelli of hindwing above (Pl. 8, figs 61, 62) . . . . . ***acdestis*** Grum-Grshimailo (p. 87)

– Sclerotized area of male eighth abdominal tergite not strongly produced, never with finger-like projections; sphragis produced backwards to form two ventral lobes (Pl. 15, fig. 102); basal black scaling of hindwing upperside usually rather less extensive 36

36 (35) Submarginal spots of hindwing upperside usually distinct and centred with blue (Pl. 8, figs 57, 58, 59, 60) . . . ***delphius*** (Eversmann) (p. 87)

– Submarginal spots of hindwing upperside, when present, paler and not centred with blue (Pl. 7, figs 55, 56) . . . . . ***patricius*** Niepelt (p. 87)

The *APOLLO*-Group

Parnassius apollonius (Eversmann)

(Pl. 1, figs 5, 6)

Doritis apollonius Eversmann, 1847 : 71, pl. 3, figs 1, 2.
Parnassius apollonius (Eversmann); Bryk, 1935 : 176.
Parnassius apollonius (Eversmann); Eisner, 1966 : 89.

Distribution. U.S.S.R.: Uzbekistan, Tadzhikistan, Kirghizia. China: western Sinkiang.

Larval food plants. *Salsola* (Elwes, 1886). *Scabiosa* (Stichel, 1907*b*). *Radiola semenovi* (A. Tsvetajev, pers. com.)

Parnassius honrathi Staudinger

(Pl. 1, figs 7, 8)

Parnassius honrathi Staudinger, 1882 : 161, pl. 1, figs 4, 5a, pl. 2, fig. 5.
Parnassius honrathi Staudinger & Bang-Haas; Bryk, 1935 : 185.
Parnassius honrathi Staudinger & Bang-Haas; Eisner, 1966 : 122.

Distribution. Afghanistan. U.S.S.R.: Tadzhikistan.

Parnassius bremeri Bremer

(Pl. 2, figs 9, 10)

Parnassius bremeri Bremer, 1864 : 6 (Felder in litt.).
Parnassius bremeri Bremer; Felder & Felder, 1865 : 133.
Parnassius bremeri Bremer; Bryk, 1935 : 190.
Parnassius bremeri Bremer; Eisner, 1966 : 94.

DISTRIBUTION. China: Heilunkiang, Shansi, Hopei. U.S.S.R.: Russia (Chita, Khabarovsk, Sakhalin, Kamchatka). Korea.

LARVAL FOOD PLANTS. Various species of *Sedum* (Stichel, 1907*b*). *S. aizon, S. ischida, S. ussuriensis, S. quadriflorum* (Kurentsov, 1970).

Parnassius phoebus (Fabricius)

(Pl. 2, figs 11, 12, Text-fig. 31)

Papilio phoebus Fabricius, 1793 : 181.
Parnassius phoebus (Fabricius); Bryk, 1935 : 206.
Parnassius phoebus (Fabricius); Eisner, 1966 : 157.

DISTRIBUTION. Europe: Italy, Austria and Switzerland. [Maritime Alps and eastward to Styria and Grossglockner, rare in north, occasional in Allgäuer Alps (Higgins & Riley, 1970).] U.S.A.: Alaska, Washington, Idaho, Montana, Dakota, Wyoming, California, Nevada, Utah, Colorado, New Mexico. Canada: British Columbia, Alberta. China: Sinkiang. U.S.S.R.: Russia (Irkutsk, Amur), Kazakhstan. Mongolia.

LARVAL FOOD PLANTS. *Saxifraga aizioides, Sempervivum montanum* (Higgins & Riley, 1970). *Sedum stenopetalum, Sempervivum* and *Saxifraga* (Wilson, 1961). *Sedum telephium, S. fabria, S. album, S. roseum* and *Sempervivum tectorum* (Bryk, 1935). *Saxifraga calycina, S. nivalis* (Kurentsov, 1970). *Carex filifolia, Gayophytum diffusum, Phlox douglasii, Sedum debile, S. obtusatum, S. wrightii* (Tietz, 1972). *Sedum lanceolatum* (=*stenopetalum*) (Scott, 1973).

Parnassius actius (Eversmann)

(Pl. 2, figs 13, 14)

Doritis actius Eversmann, 1843 : 540, pl. 9, figs 2a, b.
Parnassius actius (Eversmann); Bryk, 1935 : 249.
Parnassius actius (Eversmann); Eisner, 1966 : 82.

DISTRIBUTION. Afghanistan. U.S.S.R.: Tadzhikistan, Kirghizia, Kazakhstan. China: Sinkiang, Kansu. Pakistan. Kashmir.

Parnassius jacquemontii Boisduval

(Pl. 2, figs 15, 16)

Parnassius jacquemontii Boisduval, 1836 : 400.
Parnassius jacquemontii Boisduval; Bryk, 1935 : 257.

Parnassius jacquemontii Boisduval; Eisner, 1966 : 128.
Parnassius jacquemontii Boisduval; Ackery, 1973 : 6.

DISTRIBUTION. Afghanistan. U.S.S.R.: Tadzhikistan, Uzbekistan. China: Sinkiang, Kansu, Szechwan. N. India. Pakistan. Tibet.

Variable species. Red basal spot sometimes absent. Superficially many forms resemble *epaphus* Oberthür, but the sphragis of the female always bears a keel.

Subsp. ***mercurius*** Grum-Grshimailo [Tibet, Amdo], subsp. ***jupiterius*** Bang-Haas [Kansu, Pullow mont, Minschan], subsp. ***tatungi*** Bryk & Eisner [Kansu, Richthofen Mts, Nanschan Mts]. Wing margins distinctly chequered.

Subsp. ***thibetanus*** Leech [Szechwan, How-Kow, Ta-tsien-lou]. Dusted with black scales.

Parnassius epaphus Oberthür

(Pl. 3, figs 19, 20)

Parnassius epaphus Oberthür, 1879 : 23.
Parnassius epaphus Oberthür; Bryk, 1935 : 270.
Parnassius epaphus Oberthür; Eisner, 1966 : 106.
Parnassius epaphus Oberthür; Ackery, 1973 : 5.

DISTRIBUTION. Afghanistan. Pakistan. Kashmir. N. India. Nepal. Sikkim. Tibet. China: Sinkiang, Szechwan, Kansu, Tsinghai.

Variable species. Red basal spot sometimes present causing many specimens to resemble *jacquemontii* Boisduval, but sphragis always without a keel.

Parnassius tianschanicus Oberthür

(Pl. 3, figs 21, 22)

Parnassius corybas var. *tianschanicus* Oberthür, 1879 : 108.
Parnassius tianschanicus Oberthür; Bryk, 1935 : 288.
Parnassius tianschanicus Oberthür; Eisner, 1966 : 184.

DISTRIBUTION. U.S.S.R.: Uzbekistan, Tadzhikistan, Kirghizia. Afghanistan. Pakistan. Kashmir. China: Sinkiang.

Parnassius nomion Fischer de Waldheim

(Pl. 3, figs 17, 18)

Parnassius nomion Fischer de Waldheim, 1823 : 242, pl. 6, figs 3, 4.
Papilio apollo var. *nomion*; Geyer, [1838] : pl. 207, fig. 1029.
Parnassius nomion Hübner; Bryk, 1935 : 300.
Parnassius nomion Hübner; Eisner, 1966 : 149.

DISTRIBUTION. Mongolia. U.S.S.R.: Russia (Irkutsk, Buryat, Amur, Khabarovsk, Altay). China: Kansu, Tsinghai, Shensi, Heilungkiang, Liaoning. Korea. U.S.A.: Alaska?

LARVAL FOOD PLANTS: Yellow-flowered *Sedum* (Elwes, 1886). *S. album* (Bryk, 1935).

Red basal spot sometimes absent causing specimens to resemble *apollo* Linnaeus.

Subsp. ***epaphoides*** Bryk & Eisner [Kansu, Richthofen Mts.]. Much smaller than the typical form.

Parnassius apollo (Linnaeus)

(Pl. 3, figs 23, 24, Pl. 15, fig. 98)

Papilio apollo Linnaeus, 1758 : 465.
Parnassius apollo (Linnaeus); Latreille, 1804 : 199.
Parnassius apollo (Linnaeus); Bryk, 1935 : 325.
Parnassius apollo (Linnaeus); Eisner, 1966 : 89.

DISTRIBUTION. Sweden. Finland. Poland. Germany. France. Spain. Switzerland. Austria. Czechoslovakia. Hungary. Rumania. Italy. Bulgaria. Greece. Albania. Turkey. Syria. U.S.S.R.: Latvia, Lithuania, Ukraine, Armenia, Caucasus, Russia (Orel, Ural Mountains, Omsk, Altay, Tuva). China: Sinkiang. Mongolia.

LARVAL FOOD PLANTS: Stonecrop; *Sedum*, especially *S. album*, *S. telephium*, *S. purpurascens*, and *Sempervivum* (Higgins & Riley, 1970). *Sedum acre* (Rebel & Rogenhofer, 1893). *S. annuum*, *S. villosum* and *S. roseum* (Eisner, 1958). *S. maximum* (Holik, 1937).

Subsp. ***geminus*** Stichel (Switzerland: Grindelwald). Faintly yellowish, red spots smaller.

Subsp. ***bartholomaeus*** Stichel [Germany: Königsee]. Small, male heavily marked above.

Subsp. ***rhodopensis*** Markovic [Bulgaria: Rila Planina, Rhodopi Planina]. Very large.

Subsp. ***nevadensis*** Oberthür [Spain: Sierra Nevada]. Male above with yellow ocelli.

Subsp. ***sicilae*** Oberthür [Sicily]. Very small (Higgins & Riley, 1970).

THE *MNEMOSYNE*-GROUP

Parnassius mnemosyne (Linnaeus)

(Pl. 4, figs 25, 26, Pl. 15, fig. 99, Text-fig. 32)

Papilio mnemosyne Linnaeus, 1758 : 465.
Parnassius mnemosyne (Linnaeus); Bryk, 1935 : 19.
Parnassius mnemosyne (Linnaeus); Eisner, 1966 : 142.

DISTRIBUTION. Finland. Sweden. Denmark (Baltic Islands). Germany. France. Spain. Switzerland. Italy. Austria. Poland. Czechoslovakia. Hungary. Yugoslavia. Rumania. Bulgaria. Albania. Greece. Turkey. Syria. Lebanon. Iraq. Iran. Afghanistan. U.S.S.R.: Estonia, Latvia, Lithuania, Ukraine, Uzbekistan, Tadzhikistan, Kirghizia, Russia (Mordov, Ural Mountains).

LARVAL FOOD PLANTS. *Corydalis* (Higgins & Riley, 1970). *C. cava* and *C. helleri* (Bryk, 1935). *C. solida* (Rebel & Rogenhofer, 1893). *C. parnanica* (Kolar, 1937). *C. intermedia* (Eisner, 1958).

Parnassius stubbendorfii Ménétriés

(Pl. 4, figs 27, 28)

Parnassius stubbendorfii Ménétriés, 1849 : 273, pl. 6, fig. 2.
Parnassius stubbendorfi Ménétriés; Bryk, 1935 : 107.
Parnassius stubbendorfi Ménétriés; Eisner, 1966 : 179.

DISTRIBUTION. U.S.S.R.: Russia (Altay, Tuva, Buryat, Chita, Amur, Khabarovsk, Primorye, Sakhalin, Kurile Islands). Mongolia. Tibet. Korea. China: Heilungkiang, Kansu, Szechwan, Tsinghai. Japan: Hokkaido.

LARVAL FOOD PLANTS. *Corydalis ambigua, C. gigantaea* (Kurentsov, 1970). *Aristolochia debilis* (Lee, 1958).

Parnassius glacialis Butler

(Pl. 4, figs 29, 30, Text-fig. 6)

Parnassius glacialis Butler, 1866 : 50.
Parnassius stubbendorfi glacialis Butler; Bryk, 1935 : 128.
Parnassius glacialis Butler; Eisner, 1966 : 117.
Parnassius glacialis Butler; Ackery, 1973 : 7.

DISTRIBUTION. Japan: Hokkaido, Honshu, Shikoku. Korea. China: Hupeh, Shangtung, Kiangsu, Anhwei, Chekiang.

LARVAL FOOD PLANTS. *Corydalis incisa, C. ambigua, C. decumbens* and *C. remota* (Suguru Igarashi, in litt). *Aristolochia debilis* (Lee, 1958).

Parnassius eversmanni Ménétriés

(Pl. 4, figs 31, 32, Pl. 5, figs 33, 34)

Parnassius eversmanni Ménétriés, 1855 : 73, pl. 1, fig. 2.
Parnassius eversmanni Ménétriés; Hemming, 1934 : 199.
Parnassius eversmanni Ménétriés; Bryk, 1935 : 133.
Parnassius eversmanni Ménétriés; Eisner, 1966 : 108.

DISTRIBUTION. U.S.S.R.: Russia (Irkutsk, Buryat, Primorye, Khabarovsk, Tuva, Chita, Yakut, Magadan, Kamchatka, Yevrey). Mongolia. Japan: Hokkaido. U.S.A.: Alaska.

LARVAL FOOD PLANTS. *Corydalis gigantea* (Fumariaceae) (Wilson, 1961). *Dicentra peregrina* (Suguru Igarashi, in litt.).

Subsp. ***felderi*** Bremer [U.S.S.R.: Russia (Amur, Khabarovsk, Yevrey)].

Yellow pigment absent in male. Postdiscal and costal spots often black. Superficially similar to *glacialis* Butler.

Parnassius nordmanni (Nordmann)

(Pl. 5, figs 35, 36)

Doritis nordmanni Nordmann, 1851 : 423, pl. 13, figs 1–3.
Parnassius nordmanni (Nordmann); Hemming, 1934 : 198.
Parnassius nordmanni Ménétriés; Bryk, 1935 : 146.
Parnassius nordmanni Ménétriés; Eisner, 1966 : 149.

DISTRIBUTION. U.S.S.R.: Caucasus.

Parnassius ariadne Lederer

(Pl. 5, figs 37, 38)

Doritis clarius Eversmann, 1843 : 539, pl. 9, figs 1A, B, C (nec *clarius* Hübner, [1806] : 61, nota 6).
Parnassius ariadne Lederer, 1853 : 354.
Parnassius ariadne Lederer; Hemming, 1934 : 198.
Parnassius clarius (Eversmann); Bryk, 1935 : 151.
Parnassius clarius (Eversmann); Eisner, 1966 : 98.

DISTRIBUTION. U.S.S.R.: Russia (Altay), Tadzhikistan. Western Mongolia.

Parnassius clodius Ménétriés

(Pl. 5, figs 39, 40)

Parnassius clodius Ménétriés, 1855 : 7.
Parnassius clodius Ménétriés; Bryk, 1935 : 156.
Parnassius clodius Ménétriés; Eisner, 1966 : 98.

DISTRIBUTION. U.S.A.: Alaska, Washington, Idaho, Montana, Wyoming, Oregon, Nevada. Canada: British Columbia.

LARVAL FOOD PLANTS. *Viola*, *Sedum* (Stonecrop), *Vaccinium?*, *Rubus?* (Wilson, 1961). *Saxifraga* sp., *Vitis californica* (Tietz, 1972).

Parnassius orleans Oberthür

(Pl. 6, figs 41, 42, Text-fig. 27)

Parnassius orleans Oberthür, 1890 : 1.
Parnassius orleans Oberthür, 1891 : 8, 18, pl. 1, fig. 2.
Parnassius orleans Oberthür; Bryk, 1935 : 163.
Parnassius orleans Oberthür; Eisner, 1966 : 154.

DISTRIBUTION. Tibet. Mongolia. China: Sinkiang, Tsinghai, Kansu, Shensi, Szechwan, Yunnan.

The *HARDWICKII*-Group

Parnassius hardwickii Gray

(Pl. 6, figs 43, 44, Text-fig. 4)

Parnassius hardwickii Gray, 1831 : 32.
Lingamius hardwickei (Gray); Bryk, 1935 : 541.
Lingamius hardwickei (Gray); Eisner, 1966 : 120.

Distribution. Kashmir. N. India. Nepal. Sikkim. Bhutan.

Larval food plants. Various species of Saxifrage (Moore, 1902).

Superficially similar to *orleans* Oberthür but normally distinguishable by the white-centred, blue, submarginal series of spots on the hindwing upperside.

The *SZECHENYII*-Group

Parnassius szechenyii Frivaldszky

(Pl. 6, figs 45, 46, Pl. 15, fig. 100, Text-fig. 5)

Parnassius szechenyii Frivaldszky, 1886 : 39, pl. 4, figs 1, 1a.
Koramius szechenyii (Frivaldszky); Bryk, 1935 : 550.
Koramius szechenyi (Frivaldszky); Eisner, 1966 : 181.

Distribution. Tibet. China: Tsinghai, Kansu, Szechwan, Yunnan.

Parnassius cephalus Grum-Grshimailo

(Pl. 6, figs 47, 48, Pl. 7, figs 49, 50, Text-fig. 22, 30)

Parnassius cephalus Grum-Grshimailo, 1891 : 446.
Koramius cephalus (Grum-Grshimailo); Bryk, 1935 : 558.
Koramius cephalus (Grum-Grshimailo); Eisner, 1966 : 97.

Distribution. Tibet. China: Kansu, Szechwan, Tsinghai. Kashmir.

Subsp. ***maharaja*** Avinoff [Kashmir: Ladakh Range]. Markings generally reduced. Submarginal spots above faint, not centred with blue. Postdiscal and costal spots absent from hindwing upperside.

This subspecies (Pl. 7, figs 49, 50), treated by both Bryk (1935) and Munroe (1960) as a species, differs from typical *cephalus* in having veins R_1 and R_2 consistently anastomosing, causing it to key out as *P. acco* Gray.

The *ACCO*-Group

Parnassius acco Gray

(Pl. 7, figs 51, 52, 53, 54)

Parnassius acco Gray, 1853 : 76, pl. 12, figs 5, 6.
Tadumia acco (Gray); Bryk, 1935 : 631.
Tadumia acco (Gray); Eisner, 1966 : 82.

DISTRIBUTION. Kashmir. Tibet. Sikkim.

Subsp. ***liliput*** Bryk [Tibet: Everest District], subsp. ***hunningtoni*** Avinoff [Tibet: Dochar, Tuna, Tsangpo Valley, Dzara, Kyetrak, Chumbi Valley. Sikkim: Gangtok]. Smaller than the typical form, red markings absent.

THE *DELPHIUS*-GROUP

Parnassius patricius Niepelt

(Pl. 7, figs 55, 56)

Parnassius patricius Niepelt, 1911 : 274.
Koramius patricius (Niepelt); Bryk, 1935 : 568.
Koramius patricius (Niepelt); Eisner, 1966 : 155.

DISTRIBUTION. U.S.S.R.: Kirghizia.

Parnassius acdestis Grum-Grshimailo

(Pl. 8, figs 61, 62, Pl. 15, fig. 101, Text-fig. 7)

Parnassius delphius var. *acdestis* Grum-Grshimailo, 1891 : 446.
Koramius acdestis (Grum-Grshimailo); Bryk, 1935 : 572.
Koramius acdestis (Grum-Grshimailo); Eisner, 1966 : 82.

DISTRIBUTION. U.S.S.R.: Kirghizia. Kashmir. Tibet. Sikkim. Bhutan. China: Sinkiang, Szechwan.

The arrangement of the forewing radial veins is more variable in this species than in any other. Although veins R_1 and R_2 are usually separate, in many specimens they do appear to touch and in some cases quite definitely anastomose.

Subsp. ***lucifer*** Bryk [Sikkim: Gyamtshona]. Postdiscal and costal spots black in hindwing above.

Subsp. ***lux*** Eisner [Tibet: Jung-jung Khola]. Basal black scaling in hindwing above far less extensive than in the typical form. Postdiscal and costal spots large.

Parnassius delphius (Eversmann)

(Pl. 8, figs 57, 58, 59, 60, Pl. 15, fig. 102)

Doritis delphius Eversmann, 1843 : 541, pl. 7, figs 1a, b.
Parnassius delphius (Eversmann); Elwes, 1886 : 39.
Koramius delphius (Eversmann); Bryk, 1935 : 583.
Koramius delphius (Eversmann); Eisner, 1966 : 102.

DISTRIBUTION. Afghanistan. U.S.S.R.: Tadzhikistan, Kirghizia, Uzbekistan. Pakistan. Kashmir. N. India. Tibet. China: Sinkiang, Tsinghai.

Highly variable species. Hindwing discal spots often without red scales.

Subsp. ***pulchra*** Eisner [Kirghizia: Kungey Alatau Mountains]. Wings exceptionally dark, semi-transparent.

Although treated by Bryk (1935) and Munroe (1960) as a distinct species, *Parnassius stoliczkanus* is here regarded, in accordance with Eisner (1966), as a subspecies of *Parnassius delphius* (Eversmann). The following subspecies are those that Bryk and Munroe would have included in *Parnassius stoliczkanus* Felder & Felder.

Subsp. ***atkinsoni*** Moore [Kashmir: Pir Pinjal, Sind Valley, Burzil Pass. India: Himachal Pradesh, Kulu], subsp. ***beate*** Eisner [Kashmir: Karakoram, Potu-la Pass, Chalsi, Leh], subsp. ***chitralica*** Verity [Pakistan: Chitral], subsp. ***florenciae*** Tytler [Tibet: Phupes Hundes, Tibu, Churmurti], subsp. ***gracilis*** Bryk & Eisner [India: Himachal Pradesh, Kangra, Rohtang Pass], subsp. ***imitator*** Bryk & Eisner [U.S.S.R.: Tadzhikistan, Pamirs, Beik Pass], subsp. ***kumaonensis*** Riley [India. Uttar Pradesh, Kumaon, Shillung], subsp. ***nicevillei*** Avinoff [Kashmir: Pir Pinjal, Burzil Pass, Sari Sungur Pass, Sapta La], subsp. ***parangensis*** Eisner [India: Himachal Pradesh, Parang Pass, Bara Lacha Pass. Kashmir: Tagalang Pass, Lingti, Ladahk], subsp. ***rileyi*** Tytler [Kashmir: Rupal Valley, Astor], subsp. ***spitiensis*** Bang-Haas [Tibet: Spiti, Tum-Tum-Thang, Churmurti], subsp. ***stoliczkanus*** Felder & Felder [Kashmir: Ladak, Rupshu, Sapta La], subsp. ***tenuis*** Bryk & Eisner [Kashmir: Gya-Ladahk, Tagalang Pass], subsp. ***tytlerianus*** Bryk & Eisner [Kashmir: Chitral, Bangol Pass], subsp. ***zanskarica*** Bang-Haas [Kashmir: Nira, Zanskar Mts.], subsp. ***zogilaica*** Tytler [Kashmir: Zogila]. Generally smaller than the typical *delphius*. Red costal spot of hindwing upperside usually absent.

The *IMPERATOR*-Group

Parnassius imperator Oberthür

(Pl. 8, figs 63, 64, Pl. 15, fig. 103, Text-fig. 21)

Parnassius imperator Oberthür, 1883 : 77.
Tadumia imperator (Oberthür); Bryk, 1935 : 675.
Eukoramius imperator (Oberthür); Eisner, 1966 : 123.

Distribution. Tibet. China: Tsinghai, Kansu, Szechwan, Yunnan.

Larval food plant. *Corydalis* (Verity, 1907).

The *CHARLTONIUS*-Group

Parnassius charltonius Gray

(Pl. 9, figs 65, 66, Pl. 15, fig. 104, Text-fig. 24)

Parnassius charltonius Gray, 1853 : 77, pl. 12, fig. 7.
Koramius charltonius (Gray); Bryk, 1935 : 694.
Koramius charltonius (Gray); Eisner, 1966 : 97.

Distribution. Afghanistan. U.S.S.R.: Kirghizia, Tadzhikistan. Pakistan. Kashmir. N. India. Tibet.

Larval food plant. *Corydalis gortschakovi* (A. Tsvetajev, pers. com.)

Parnassius inopinatus Kotzsch

(Pl. 9, figs 67, 68, Pl. 15, fig. 105)

Parnassius inopinatus Kotzsch, 1940 : 17.
Kailasius inopinatus (Kotzsch); Eisner, 1966 : 123.

DISTRIBUTION. Afghanistan: Firus-Kuhi Range, Koh-i-Baba Range.

Parnassius loxias Püngeler

(Pl. 9, figs 69, 70)

Parnassius loxias Püngeler, 1901 : 178, pl. 1, figs 5, 6.
Koramius loxias (Püngeler); Bryk, 1935 : 717.
Eukoramius loxias (Püngeler); Eisner, 1966 : 132.

DISTRIBUTION. U.S.S.R.: Kirghizia. China: Sinkiang.

Parnassius autocrator Avinoff

(Pl. 9, figs 71, 72, Text-fig. 28)

Parnassius charltonius autocrator Avinoff, 1913 : 16, pl. 2, fig. 2.
Koramius charltonius autocrator (Avinoff); Bryk, 1935 : 716.
Eukoramius autocrator (Avinoff); Eisner, 1966 : 91.

DISTRIBUTION. Afghanistan. U.S.S.R.: Tadzhikistan.

LARVAL FOOD PLANT. *Corydalis adiantifolia* (Wyatt & Omoto, 1963).

THE *TENEDIUS*-GROUP

Parnassius tenedius Eversmann

(Pl. 10, figs 75, 76, Text-fig. 3)

Parnassius tenedius Eversmann, 1851 : 621.
Tadumia tenedius (Eversmann); Bryk, 1935 : 647.
Tadumia tenedius (Eversmann); Eisner, 1966 : 181.

DISTRIBUTION. Mongolia. U.S.S.R.: Russia (Yakut, Tuva, Chita). China: Inner Mongolia.

LARVAL FOOD PLANT. *Corydalis* sp. (*bracteata*?)(A. Tsvetajev, pers. com.).

THE *SIMO*-GROUP

Parnassius simo Gray

(Pl. 10, figs 73, 74, Text-fig. 8)

Parnassius simo Gray, 1853 : 76.
Tadumia simo (Gray); Bryk, 1935 : 654.
Tadumia simo (Gray); Eisner, 1966 : 178.

DISTRIBUTION. U.S.S.R.: Kirghizia, Tadzhikistan. Kashmir. N. India. Mongolia. Tibet. China: Sinkiang, Kansu.

Tribe **ZERYNTHIINI**

Zerynthianae Grote, 1899 : 17. Type-genus: *Zerynthia* Ochsenheimer.

SERICINUS Westwood

Sericinus Westwood, 1851 : 173. Type-species: *Papilio telamon* Donovan, by original designation.
Sericinus Westwood; Bryk, 1934 : 77.
Sericinus Westwood; Munroe, 1960 : 13.

Sericinus montela Gray

(Pl. 10, figs 77, 78, Text-figs 16, 26)

Papilio telamon Donovan, 1798 : pl. 27, fig. 1. [Junior homonym of *Papilio telamon* Linnaeus, 1758 : 486.]
Sericinus montela Gray, 1853 : 78, pl. 13, figs 1, 2.
Sericinus telamon (Donovan); Bryk, 1934 : 80.
Sericinus telamon montela Gray; Bryk, 1934 : 89.
Sericinus montela Gray; Eisner, 1966 : 142.
Sericinus telamon (Donovan); Eisner, 1966 : 181.
Sericinus montela Gray; Hemming, 1967 : 409.

DISTRIBUTION. China: Heilungkiang, Kirin, Liaoning, Hopei, Shangtung, Anhwei, Kiangsu, Hunan, Hupeh, Kiangsi, Kansu. Korea.

LARVAL FOOD PLANTS. *Aristolochia* (Leech, 1893 : 488). *A. contorta* (Kurentsov, 1970).

PARNALIUS Rafinesque

Thais Fabricius, 1807 : 283. Type-species: *Papilio hypsipyle* Fabricius, by monotypy. [Junior homonym of *Thais* Röding, 1789.]
Parnalius Rafinesque, 1815 : 128. [Replacement name for *Thais* Fabricius.]
Zerynthia Ochsenheimer, 1816 : 29. [Replacement name for *Thais* Fabricius.]
Eugraphis Billberg, 1820 : 75. Type-species: *Papilio hypsipyle* Fabricius, by monotypy.
Parnalius Rafinesque; Sherborn, 1929 : 4765.
Zerynthia Ochsenheimer; Sherborn, 1932 : 7041.
Allancastria Bryk, 1934 : 19, 61–62. Type-species: *Thais cerisy* Godart, by original designation. **Syn. n.**
Zerynthia Ochsenheimer; Bryk, 1934 : 31.
Parnalius Rafinesque; Neave, 1940*a* : 614.
Zerynthia Ochsenheimer; Neave, 1940*b* : 689.
Allancastria Bryk; Munroe, 1960 : 10.
Zerynthia Ochsenheimer; Munroe, 1960 : 13.
Zerynthia Ochsenheimer; Hemming, 1967 : 464.
Parnalius Rafinesque; Cowan, 1970 : 11. [*Zerynthia* Ochsenheimer cited as synonym.]

According to Cowan (1970) Rafinesque introduced the name *Parnalius* for *Thais* Fabricius, which was invalid as a junior homonym. The name is available and valid, and is a senior objective synonym of *Zerynthia* Ochsenheimer, 1816. It has been correctly listed by both Sherborn (1929) and Neave (1940).

The genus *Allancastria* Bryk is here treated as a synonym of *Parnalius* Rafinesque. The differences in venation, as figured by Bryk (1934), do not appear to be consistent although the genitalia are certainly distinct. If *Allancastria* Bryk is to be recognized as a valid genus it would seem to me that there is equal justification for raising the status of the species groups of *Parnassius* to genera. In order to maintain consistency in approach I am regarding *Allancastria* Bryk and *Parnalius* Rafinesque as being subjectively synonymous.

Key to the species of *PARNALIUS* Rafinesque

1 Cell 2*A* of forewing underside uniformly scaled, without distinct red or black discal spot; uncus long, bifid; clasper narrow (Text-fig. 11, Pl. 10, figs 79, 80) ***cerisy*** (Godart) (p. 91)

– Cell 2*A* of forewing underside with a distinct red or black discal spot; uncus short, bifid; clasper broad (Text-figs 9, 10) 2

2 (1) Forewing upperside usually with distinct red spots in the discal cell and with a vitreous spot near the wing apex; uncus in dorsal aspect narrowing towards the base; clasper distinctly produced dorso-posteriorly (Text-fig. 10, Pl. 11, figs 83, 84) . . . . . ***rumina*** (Linnaeus) (p. 92)

Forewing upperside usually with black spots in the discal cell, seldom red, and vitreous spot absent from the wing apex; uncus in dorsal aspect narrowing towards the apex; clasper slightly produced dorso-posteriorly (Text-fig. 9, Pl. 11, figs 81, 82) . . . ***polyxena*** (Denis & Schiffermüller) (p. 91)

Parnalius cerisy (Godart) **comb. n.**

(Pl. 10, figs 79, 80, Text-figs 11, 17)

Thais cerisy Godart, [1824] : 812.
Zerynthia cerisyi (Godart); Stichel, 1907*a* : 82.
Allancastria cerisyi (Godart); Bryk, 1934 : 63.
Allancastria cerisy (Godart); Cowan, 1970 : 17, 41.

Distribution. Cyprus. Crete. Greece. Yugoslavia. Bulgaria. Rumania. Albania. Turkey. U.S.S.R.: Armenia. Iran. Iraq. Syria. Israel. Lebanon.

Larval food plants: *Aristolochia clematis* and *A. hastata* (Bryk, 1934). *A. maurorum* (Suguru Igarashi, in litt.).

Parnalius polyxena (Denis & Schiffermüller) **comb. n.**

(Pl. 11, figs 81, 82, Text-figs 9, 19)

Papilio hypermnestra Scopoli, 1763 : 149, pl. [17], fig. 425. [Junior homonym of *Papilio hypermnestra* Linnaeus, 1763 : 40.]
Papilio polyxena Denis & Schiffermüller, 1775 : 162.

Papilio hypsipyle Fabricius, 1777 : 265.
Zerynthia hypermnestra (Scopoli); Bryk, 1934 : 34.
Zerynthia hypermnestra (Scopoli); Eisner, 1966 : 123.
Zerynthia polyxena (Denis & Schiffermüller); Hemming, 1967 : 436.

Hemming (1967) gives a detailed explanation of the nomenclatorial history of this species and how *polyxena* was finally established as the valid name.

DISTRIBUTION. S. France. Austria. Italy. Sicily. Yugoslavia. Hungary. Rumania. Albania. Greece. Czechoslovakia.

LARVAL FOOD PLANTS. *Aristolochia pistolochia*. *A. rotunda* and *A. clematis* (Higgins & Riley, 1970). *A. sicula* (Bryk, 1934).

Parnalius rumina (Linnaeus) **comb. n.**

(Pl. 11, figs 83, 84, Text-fig. 10)

Papilio rumina Linnaeus, 1758 : 480.
Thais maturna Butler, 1870 : 232.
Zerynthia rumina (Linnaeus); Bryk, 1934 : 50.

DISTRIBUTION. S. France. Spain. Portugal. Algeria. Morocco. Tunisia.

LARVAL FOOD PLANTS. Various kinds of *Aristolochia* (Higgins & Riley, 1970). *A. pistolochia* and *A. fontanesi* (Bryk, 1934).

LUEHDORFIA Crüger

Luehdorfia Crüger, 1878 : 128. Type-species: *Luehdorfia eximia* Crüger, by monotypy.
Luehdorfia Crüger; Bryk, 1934 : 99.
Luehdorfia Crüger; Munroe, 1960 : 13.

KEY TO THE SPECIES OF *LUEHDORFIA* CRÜGER

1 Claspers of male covered with thick golden brown pubescence; ventral spinose setae, placed internally on claspers, elongate (Text-fig. 12); sphragis of female keeled (Pl. 11, figs 85, 86) . . . . . ***puziloi*** (Erschoff) (p. 92)
– Claspers of male covered with thick black pubescence; ventral setae, placed internally on claspers, shorter (Text-fig. 13); sphragis of female without keel (Pl. 11, figs 87, 88, 89, 90) . . . . . ***japonica*** Leech (p. 93)

Luehdorfia puziloi (Erschoff)

(Pl. 11, figs 85, 86, Text-fig. 12)

Thais puziloi Erschoff, 1872 : 315.
Luehdorfia eximia Crüger, 1878 : 128.
Luehdorfia puziloi (Erschoff); Bryk, 1934 : 102.

DISTRIBUTION. U.S.S.R.: Russia (Primorye). Korea. Japan: Hokkaido, Honshu.

LARVAL FOOD PLANTS. *Asarum* (Graeser, 1888). *A. sieboldi* (Kurentsov, 1970).

Luehdorfia japonica Leech

(Pl. 11, figs 87, 88, 89, 90, Text-figs 13, 23)

Luehdorfia japonica Leech, 1889 : 25, pl. 1, figs 1, 1b, 1c.
Luehdorfia japonica japonica Leech; Bryk, 1934 : 102.

DISTRIBUTION. Japan: Honshu. Taiwan. China: Liaoning, Kirin, Hupeh, Anhwei, Kiangsu, Kiangsi.

LARVAL FOOD PLANTS. *Asarum nipponicum, A. tamaense, A. blumei, A. caulescens* and *A. sieboldi* (Suguru Igarashi, in litt.).

Subsp. ***chinensis*** Leech (China: Hupeh, Anhwei, Kiangsu, Kiangsi). Hindwing upperside with red submarginal band. Internervular marginal spots of hindwing yellow.

The latter taxon, variously treated by authors, was regarded by Bryk (1934) as a subspecies of *puziloi* Erschoff. The male genitalia, however, show a close resemblance to those of *japonica* Leech both in the shape of the claspers and in the length of the setae placed internally thereon. These characters, together with the unkeeled sphragis of the female, seem to indicate that this taxon was correctly placed by Rothschild (1918) as a subspecies of *japonica* Leech, and it is here so treated.

BHUTANITIS Atkinson

Armandia Blanchard, 1871 : 809, nota 3. Type-species: *Armandia thaidina* Blanchard, by monotypy. [Homonym of *Armandia* Filippi, 1862.]
Bhutanitis Atkinson, 1873 : 570. Type-species: *Bhutanitis lidderdalii* Atkinson, by monotypy.
Bhutanitis Atkinson; Bryk, 1934 : 113.
Bhutanitis Atkinson; Munroe, 1960 : 13.

KEY TO THE SPECIES OF *BHUTANITIS* ATKINSON

1 Hindwing upperside with a series of orange marginal internervular markings . 2
– Hindwing upperside without orange marginal internervular markings, being yellow or grey in these areas 3
2 (1) Vein M_3 of hindwing produced to broad spatulate tail; clasper of male bluntly produced posteriorly and bearing a tuft of thick black pubescence (Text-fig. 14, Pl. 12, figs 92, 93) . . . . . ***thaidina*** (Blanchard) (p. 93)
– Vein M_3 of hindwing produced to a narrow tail; clasper of male pointed and bearing sparse pubescence only (Text-fig. 15, Pl. 13, figs 94, 95) ***lidderdalii*** Boisduval (p. 94)
3 (1) Vein Cu_{1b} of hindwing produced to a round lobe; pale bands of wings broad, resembling *Luehdorfia*; female bearing a sphragis (Pl. 12, fig. 91) ***mansfieldi*** (Riley) (p. 94)
– Vein Cu_{1b} of hindwing produced to a distinct tail; pale bands of wings narrow; female without sphragis (Pl. 14, figs 96, 97) . . ***ludlowi*** Gabriel (p. 94)

Bhutanitis thaidina (Blanchard)

(Pl. 12, figs 92, 93, Text-figs 14, 25)

Armandia thaidina Blanchard, 1871 : 809.
Bhutanitis thaidina (Blanchard); Bryk, 1934 : 116.

DISTRIBUTION. China: Shensi, Szechwan, Yunnan.

LARVAL FOOD PLANT. *Aristolochia* sp. (Bryk, 1934).

Bhutanitis lidderdalii Atkinson

(Pl. 13, figs 94, 95, Text-fig. 15)

Bhutanitis lidderdalii Atkinson, 1873 : 570, pl. 50.
Bhutanitis lidderdalii Atkinson; Bryk, 1934 : 118.

DISTRIBUTION. Bhutan. Sikkim. N. India: Assam, Nagaland, Manipur. N. Burma. China: Szechwan, Yunnan.

Bhutanitis ludlowi Gabriel

(Pl. 14, figs 96, 97)

Bhutanitis ludlowi Gabriel, 1942 : 189.

DISTRIBUTION. Bhutan: Trashiyangsi Valley.

As far as I am aware, the type-series of *ludlowi* Gabriel is unique, no other representatives of this species being known to me.

Bhutanitis mansfieldi (Riley)

(Pl. 12, fig. 91)

Armandia mansfieldi Riley, 1939*a* : 207, pl. 4.
Bhutanitis mansfieldi (Riley); Riley, 1939*b* : 267.

DISTRIBUTION. China: Yunnan.

This species, known to me from the female holotype only, bears a curious resemblance to *Luehdorfia* Crüger in both pattern and wing shape; furthermore it is the only *Bhutanitis* species in which the female bears a sphragis. When more material becomes available, examination of the male genitalia may show whether it has been correctly placed here.

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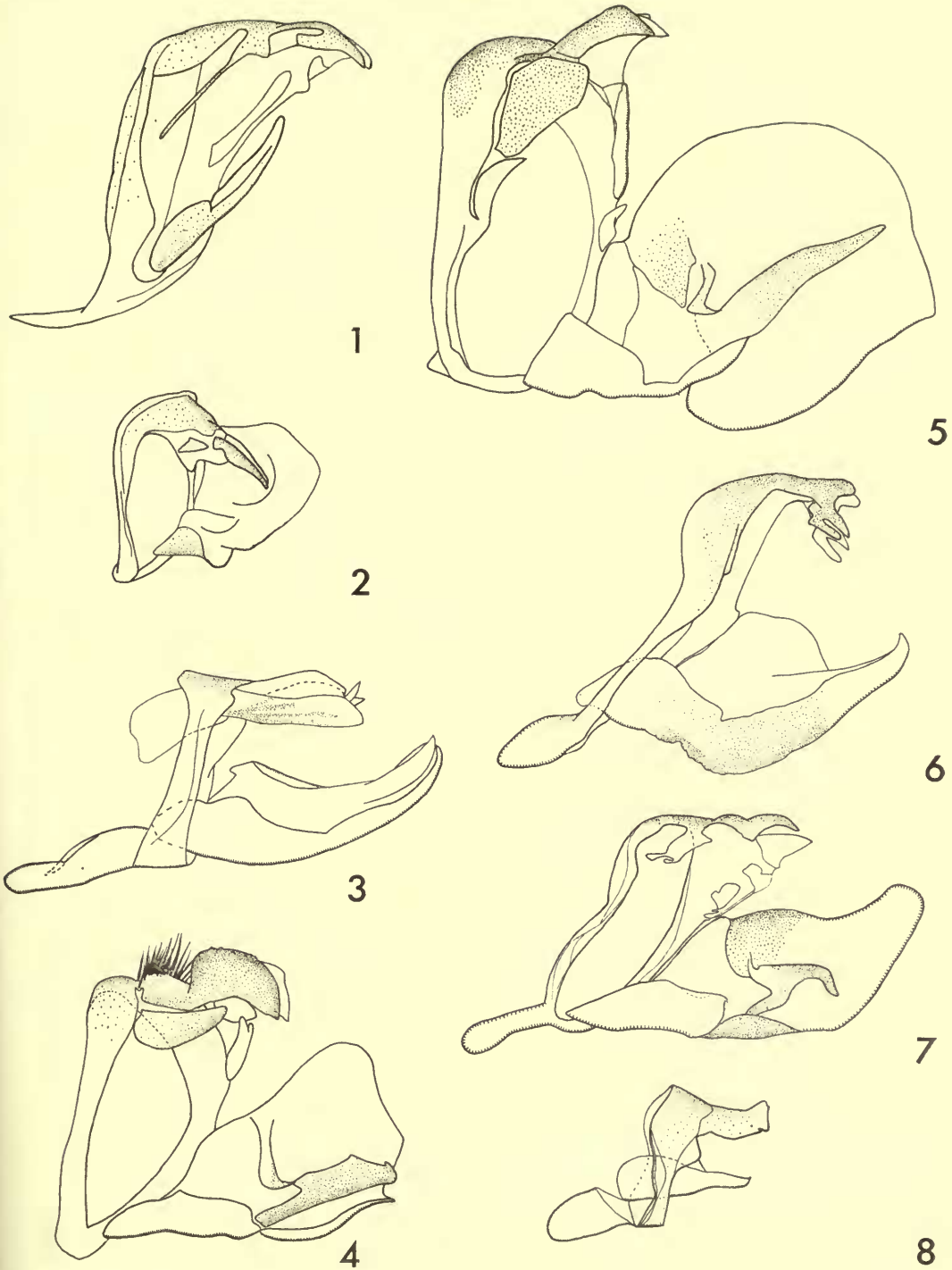
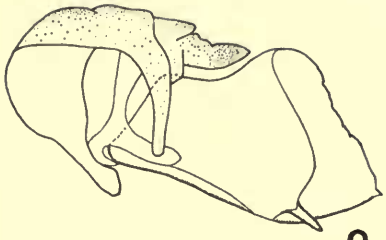


FIGS 1–8. Male genitalia, left clasper removed. 1, *Archon apollinus amasinus* (Staudinger & Rebel). 2, *Hypermnestra helios maxima* Grum-Grshimailo. 3, *Parnassius tenedius tenedius* Eversmann. 4, *P. hardwickii hardwickii* Gray. 5, *P. szechenyii szechenyii* Frivaldsky. 6, *P. glacialis glacialis* Butler. 7, *P. acdestis lathonius* Bryk. 8, *P. simo simonius* Staudinger.



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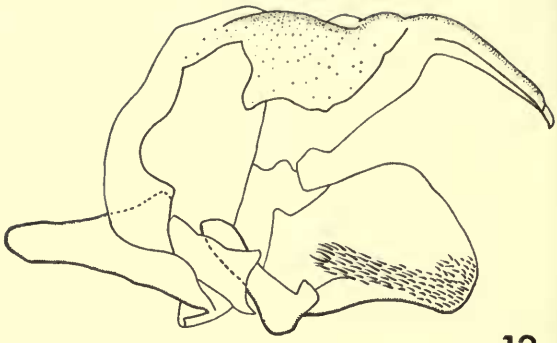

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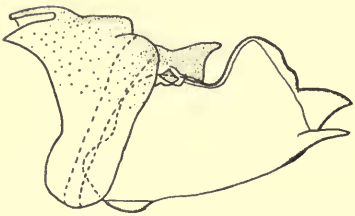

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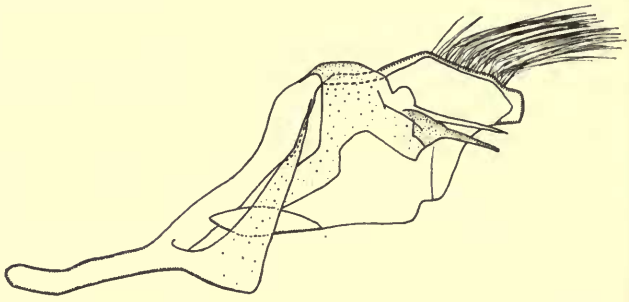

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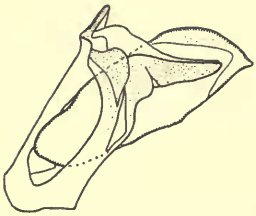

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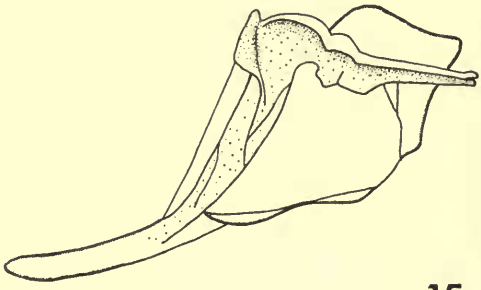

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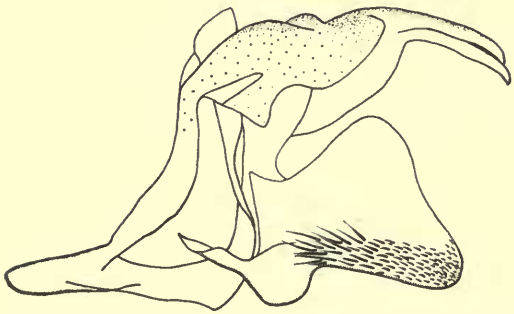

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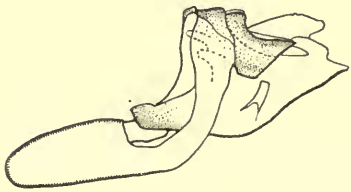

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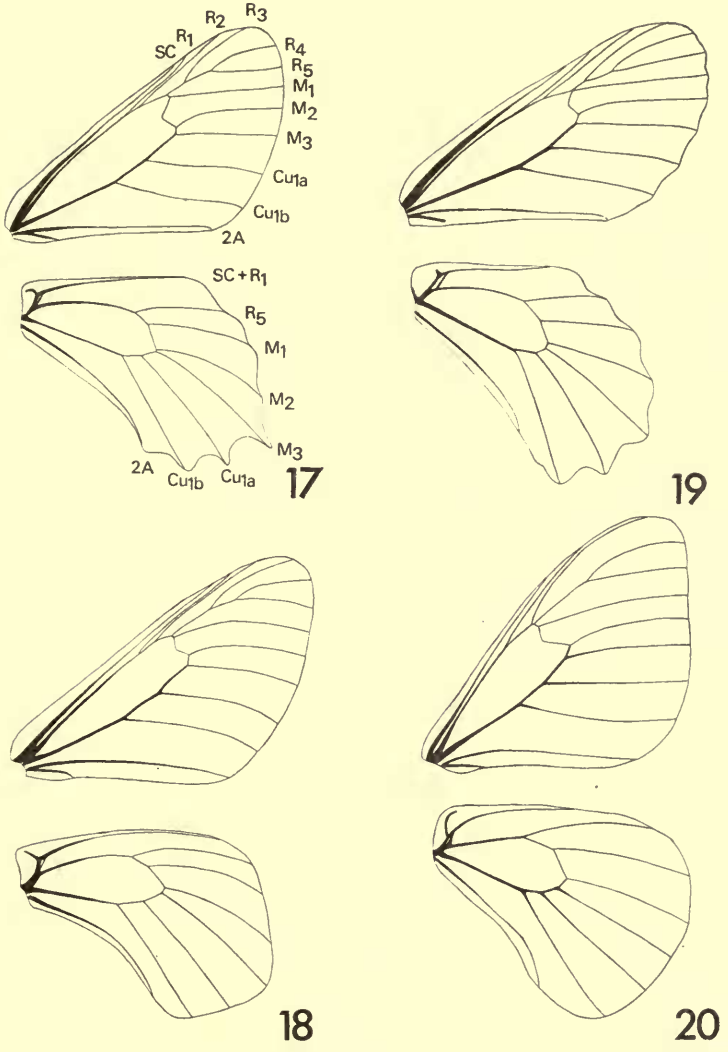
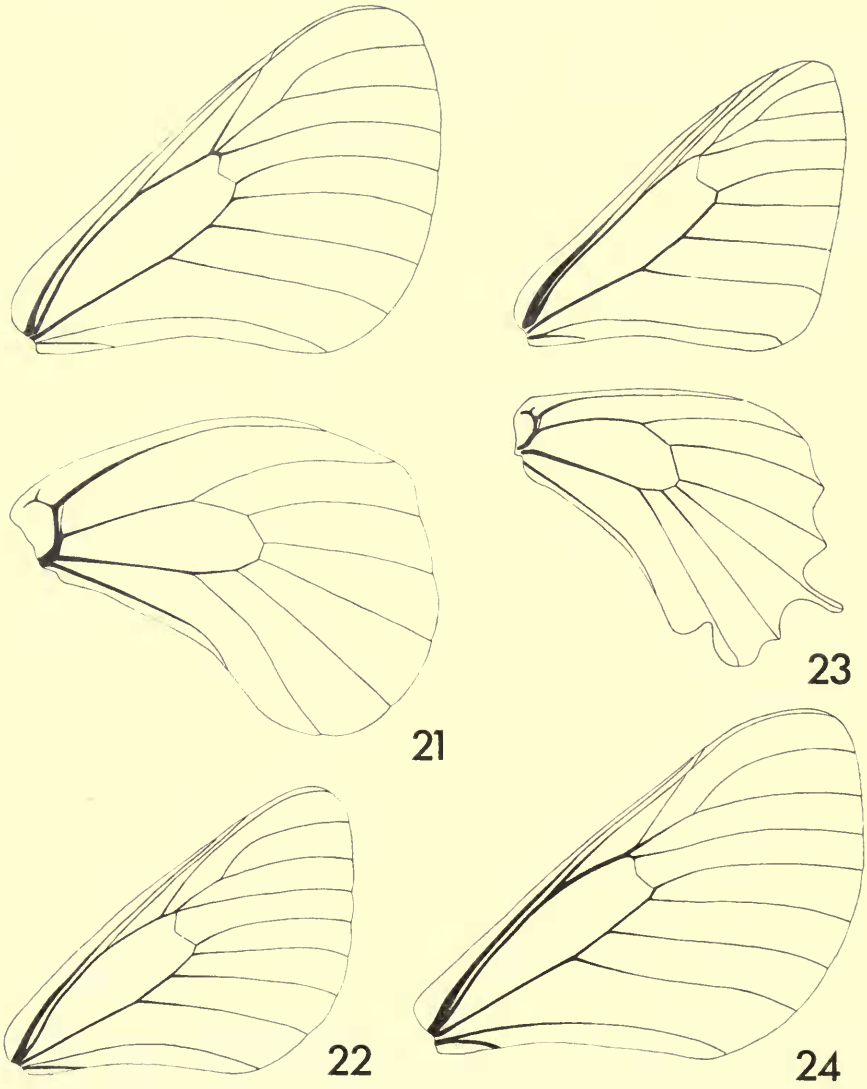
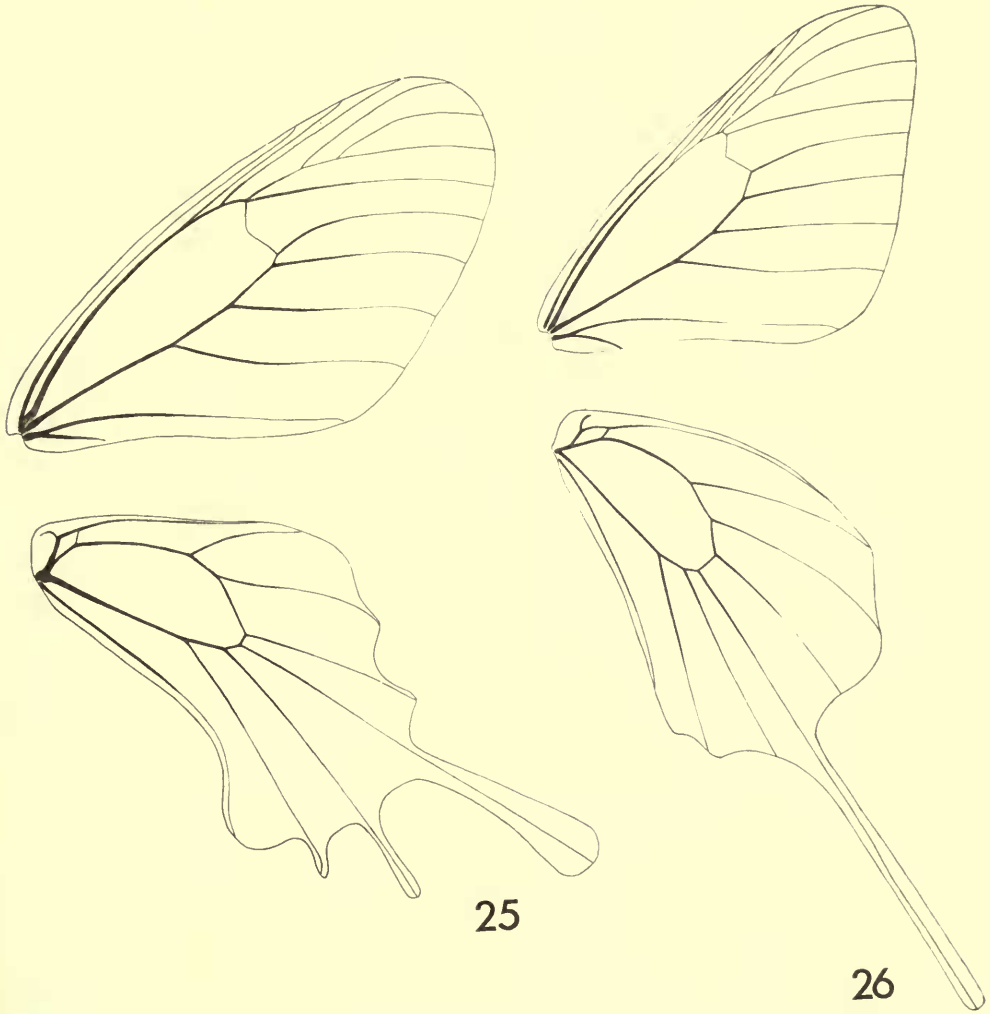
FIGS 9–16. Male genitalia, left clasper removed. 9, *Parnalius polyxena polyxena* (Denis & Schiffermüller). 10, *P. rumina australis* (Esper). 11, *P. cerisy speciosa* (Stichel). 12, *Luehdorfia puziloi puziloi* (Erschoff). 13, *L. japonica japonica* Leech. 14, *Bhutanitis thaidina thaidina* (Blanchard). 15, *B. lidderdalii lidderdalii* Atkinson. 16, *Sericinus montela magnus* Fruhstorfer.



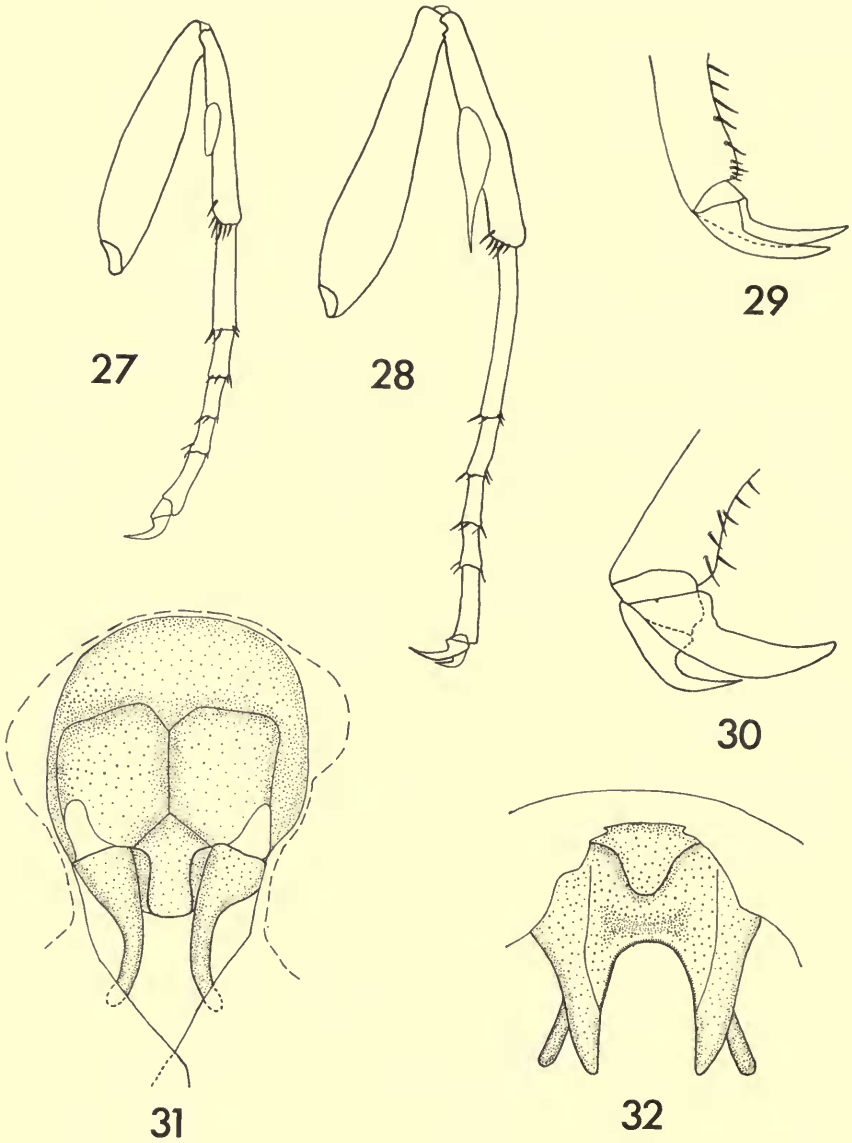
FIGS 17–20. Venation of right fore- and hindwings. 17, *Parnalius cerisy speciosa* (Stichel). 18, *Archon apollinus amasina* (Staudinger & Rebel). 19, *Parnalius polyxena polyxena* (Denis & Schiffermüller). 20, *Hypermnestra helios maxima* Grum-Grshimailo.



FIGS 21–24. Venation of right fore- and hindwings. 21, *Parnassius imperator imperator* Oberthür. 22, *P. cephalus ares* Bryk & Eisner [forewing only]. 23, *Luehdorfia japonica japonica* Leech. 24, *Parnassius charltonius deckerti* Verity [forewing only].



FIGS 25–26. Venation of right fore and hindwings. 25, *Bhutanitis thaidina thaidina* (Blanchard). 26, *Sericinus montela magnus* Fruhstorfer.



FIGS 27–32. 27–28, forelegs, showing foretibial epiphysis of (27) *Parnassius orleans* Oberthür, (28) *P. autocrator* Avinoff. 29–30. Male tarsal claws of forelegs of (29) *Hypermnestra helios* (Nickerl), (30) *Parnassius cephalus* Grum-Grshimailo. 31–32. Dorsal view of uncus of (31) *P. phoebus* (Fabricius), (32) *P. mnemosyne* (Linnaeus).

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Synonyms are in *italics*.

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